

RAPID COMMUNICATION

Worldwide Availability and Utilization of PET/CT from IAEA Survey: Potential for Nuclear Cardiology Applications

João V. Vitola, MD, PhD¹⁾, Maurizio Dondi, MD²⁾, Pedro Prado, MSc¹⁾,
Leslee Shaw, PhD³⁾ and Diana Paez, MD²⁾

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Abstract

Hybrid imaging using PET/CT have various applications in cardiology. Anatomy, physiology or both can be evaluated. Routine attenuation correction can be performed and improve accuracy for nuclear cardiology studies. The extent of availability and utilization of hybrid imaging technology worldwide is currently unknown. The International Atomic Energy Agency (IAEA) in cooperation with QUANTA performed a web-based survey among physicians working with nuclear imaging to evaluate the current availability of hybrid imaging and its use for nuclear cardiology (NC). Contact e mails of physicians working in the field of nuclear cardiology were available from a data base at the human health department of the IAEA in Vienna, Austria and an international network of nuclear cardiologist at QUANTA in Curitiba, Brazil. Data from 80 countries in both high-income countries (HIC, n=16) and low-and-middle income countries (LMIC, n=64) representing all world regions, was obtained. At the country level, PET/CT is available in all world regions being widely available in North and Latin America, Europe, Asia and Oceania with a heterogeneous availability in Africa. Nevertheless, only 22.4% of centers in HIC and 10.9% in LMIC that have PET/CT available use it for NC applications. These data will help us to work with scientific societies and institutions to design strategies to diffuse information for physicians so they can take full advantage of PET/CT technology to obtain additional information that could impact patient care.

Keywords: IAEA, Myocardial blood flow, Nuclear cardiology, PET/CT

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Hybrid imaging using positron emission tomography (PET/CT) has grown tremendously in the past several years for oncologic applications and it has various potential applications in cardiology (1). Cardiac anatomy, physiology or both can be evaluated using PET/CT. Increasingly, the value of PET/CT is recognized to evaluate various aspects of ischemic heart disease, including absolute myocardial blood flow (MBF), coronary flow reserve (CFR) and myocardial viability (2). In addition, cardiac involvement by inflammatory disease such as sarcoidosis, as well as infective endocarditis of prosthetic heart valves have become common indications for cardiac PET/CT (3, 4). Image quality of nuclear cardiology (NC) studies is much improved by the routine use of CT based attenuation correction on PET/CT and higher energy positron

rather than SPECT imaging.

Current availability of PET/CT worldwide for nuclear cardiology

Patient access to PET/CT might be limited at the world level (5) for several reasons. These include: technology and/or tracer availability, lack of reimbursement, lack of knowledge about potential benefits. The International Atomic Energy Agency (IAEA) in cooperation with QUANTA performed recently a web-based survey among physicians working with nuclear imaging to evaluate the current availability of PET/CT imaging worldwide and its use in NC. A total of 476 physicians opened the e mail received and of these 232 (48.7%) replied to our request. Data from 80 countries in both

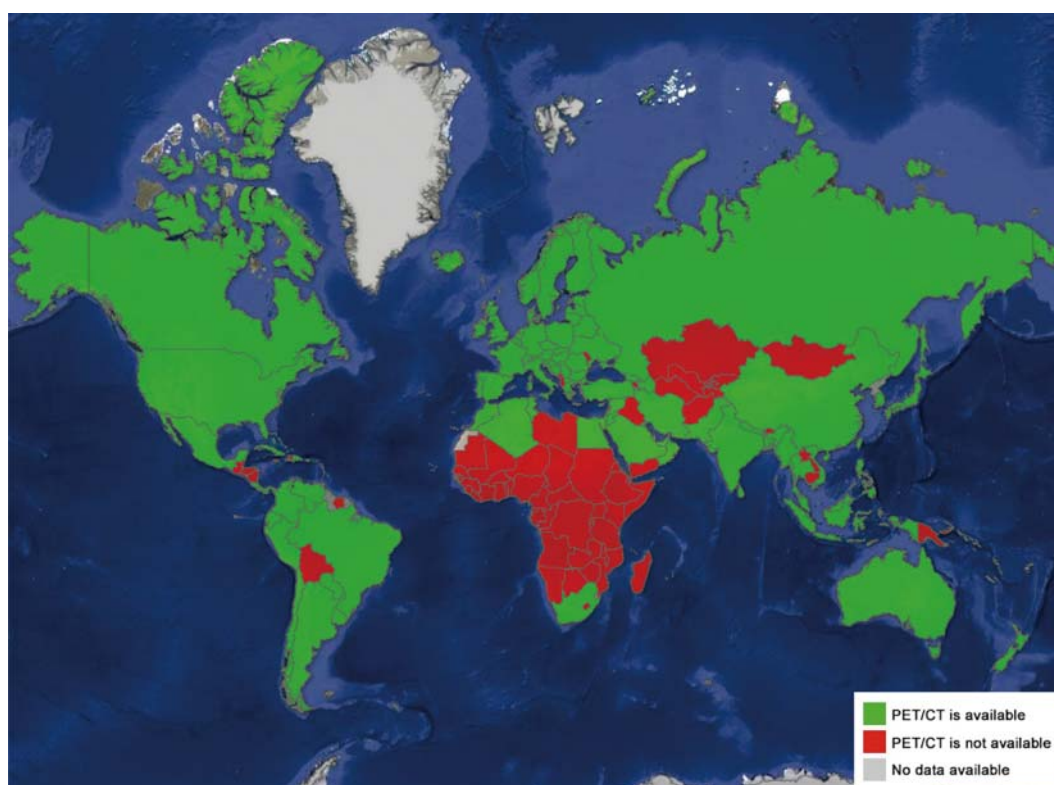


Figure 1 Availability of PET/CT technology worldwide.

This data from the IAEA allowed for a worldwide assessment of availability and utilization PET/CT worldwide with potential implications for nuclear cardiology practice in these countries. Unfortunately, at this time, few centers in HIC and even fewer in LMIC use their available PET/CT for cardiac applications. In a broader sense, most of LMIC still perform very small volume of NC in any type of equipment, hybrid or not. These data will help us to work with scientific societies and institutions to design strategies to diffuse information and take full advantage of these technologies to the maximum extent possible.

HIC: high-income countries, LMIC: low-and-middle income countries

high-income countries (HIC, n=16) and low-and-middle income countries (LMIC, n=64) representing all world regions, were obtained. This survey, together with data already available at the IAEA database (www.iaea.org), allowed for an assessment of the diffusion and use of PET/CT worldwide.

We have previously observed that the utilization of NC worldwide, using any type of equipment, especially in LMIC, is relatively low (6). In this recent IAEA/QUANTA survey, conducted 10 years after the previous survey, it is clear that the practice of NC in general (using SPECT or PET) remains either non-existent or practiced at very little volume (<50 NC patients per month per center) in more than 50% of centers in LMIC. In contrast, we also observed that nearly 50% of the centers in HIC perform at least 100 patients per month. PET/CT, at the country level, is available in all world regions (Figure 1). This survey has shown that 79.3% of participants from HIC and 63.2% from those in LMIC do have PET/CT technology available. PET/CT technology is widely available in North and Latin America, Europe, Asia and Oceania with a heterogeneous availability in Africa. Only 22.4% of centers in HIC and 10.9% in LMIC that have PET/CT available use it for multiple NC applications, including myocardial perfusion and

others (i. e. sarcoidosis, myocardial viability assessment, endocarditis).

Finally, when participants were inquired about the progress of PET/CT for cardiac applications at their centers in the past 5 years, their answers showed that an increase was observed by 64.5% of participants in HIC as opposed to only 47.5% of those in LMIC.

Conclusions

In this brief communication we highlighted the availability of PET/CT technology worldwide. Given the unique and important information provided by PET/CT technology, including its most recent utilization in cardiac inflammatory and infection processes, it is unfortunate that PET/CT remains seldomly used for nuclear cardiology applications. All the hurdles have prevented its increased utilization needs to be reviewed and understood and actions taken. The IAEA, together with its numerous prominent partners in the scientific community and professional societies can continue bringing awareness and educating professionals on the role of this advanced and useful imaging technology to the most various scenarios of patients with heart disease.

Acknowledgments and conflict of interest disclosure

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Reprint requests and correspondence:

João V. Vitola, MD, PhD

Rua Almirante Tamandaré 1000 Alto da XV, Curitiba, PR,
CEP 80045-170, Brazil

E-mail: joaovitola@quantamn.com.br

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